

# Municipal Journal

and

# Public Works

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#### Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send to Municipal Journal and Public Works regularly their annual and special reports.

#### Information Bureau.

The Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

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#### MUNICIPAL JOURNAL AND PUBLIC WORKS. City, County and State.

With this issue the name of Municipal Journal is changed by the addition of the words and Public Works. The change in name does not mean any change in policy, however. We shall continue to put editorial accent on municipal improvements and endeavor to make the paper more than ever valuable to engineers, heads of all municipal departments, and contractors in connection with the constructing and operating of municipal and other public works and utilities.

The chief aim in making the change in name is to indicate to those who are not familiar with the paper that it is not chiefly a "journal" of municipal happenings and doings, but that it gives special prominence to public works, and to those of county and state as well as of city. In the broad and dictionary definition of "municipal," that word covers all these, but in the popular mind it has come to be limited to city only.

As in the past, we ask the advice and cooperation of all who are interested directly in public works and utilities, to the end that this may continue to be the paper to which they may turn for information and help.

#### GIVE THEM JOBS AS WELL AS HONORS.

For several months we have been urging that each city in the country undertake to find positions for its own citizens among the returning soldiers and sailors, and that announcement to this effect be made to the boys before or as soon as they reach this country. The federal agents, and especially the Employment Service of the Department of Labor, adopted the idea and made similar request of all cities. This has been supplemented by the direct placing of thousands of the discharged men by the Employment Service itself. But owing to the failure of Congress to make any appropriation for the continuance of the work of this bureau, it has become more than ever necessary for the cities to take immediate and practical steps for the carrying on of the work. Advice and cooperation will be furnished by a committee of the National Chamber of Commerce with headquarters at Washington.

The boys were certainly "on the job" over there. See that they get promptly on a job over here.

### THE CONSTRUCTION PROSPECT.

The U. S. Department of Labor reports that a nation-wide inquiry reveals projected work totaling in value about \$1,709,000,000. More than thirty per cent of this is in the three states, Illinois, New York and Ohio, but every state but one reports more than a million dollars' worth. It is interesting to note that nearly three-fourths of the total estimated cost is for public works, although the number of public projects constitute only 54 per cent. of the total. The average cost of each private project is about \$153,000 (one of them, Chicago's railroad terminal, is for \$60,000,000), while the average for public projects is about \$387,300. These figures indicate the important part that public works are to play in this adjustment period.

### GRAND HAVEN'S MUNICIPAL UTILITIES.

The financial statement of the city of Grand Haven, Michigan, audited by the Michigan Trust Company, has been sent to us by city manager I. R. Ellison, and the figures certainly warrant the pride that he takes in them.

During the past three years, since the manager form of government went into effect, the tax rate has decreased although the valuation has remained practically constant. The bonded indebtedness has been diminished, however; compared to which, the city had issued refunding bonds on four separate occasions in previous years because of inability to meet its obligations then due.

The electric light plant showed a net profit, after setting aside \$8,614.57 for the depreciation fund, of \$8,380.48, in spite of the fact that the cost of operating during 1918 was about \$18,000 above normal, owing to high price of coal and labor. The rates charged for current were 9 cts. per kw. h. for general lighting, 10 per cent discount for prompt payment; commercial lighting rate, \$2.50 per month per kw. of maximum demand; power, demand charge, 60 cts. per month per active h. p. connected, and 1.7 cts. per kw. h. for energy. The entire plant has been rebuilt during the past three years without a bond issue.

The water works have generally shown a deficit, that in 1917 being \$2,500; but last year there was a net profit of \$667.16 after setting aside \$4,533 for the depreciation fund. The water rates have not been changed during the past three years.

### WASTE PAPER REPORTS.

An annual report of a water board has reached us which contains seventy pages, sixty-eight of which are waste paper, for all of the information concerning the year's operation that is given, that it is desirable to include, could be printed on two pages. The report contains:

List of all mains and fire hydrants in system....	12	pages
Rules (adopted 8 years ago).....	8	"
Itemized accounts (includes every 25c. and 30c. item) .....	17	"
Rates (could have been put on one page).....	2	"
Description of plant (could be put on one page)..	2	"
Photographs of features of plants 4 to 20 yrs. old	8	"
Brief notes facing photographs.....	8	"
Personnel of the board.....	1	"
"Order of Business" of its meetings.....	1	"
Blank .....	11	"
Total .....	70	"

And with it all, not a word describing what the board did during the year, except the figures of receipts and expenditures. The rest could be, and probably is, used in the reports year after year.

Such a report would be read by the average taxpayer with the same avidity and interest, but not half the information, as an unabridged dictionary. It is almost entirely useless and wasteful of money. The few facts given that were worth giving are so buried in a mass of antique or insignificant matter that the average citizen would never discover them.

This is an extreme illustration of what is found in too many municipal reports. If we should judge the conduct of municipal plants by the lack of intelligence and ability shown in reports such as these, the occasional failure of municipal ownership is easily accounted for. Fortunately, most municipal officials prepare reports from which the citizens of average intelligence can obtain a clear and full idea of what their departments have done during the year. But taxpayers who have imposed upon them such padded volumes of non-information as the above should protest against the failure of their officials to give them the information concerning their plants to which they are entitled, and against the waste of the city's money in printing such quantities of unnecessary matter.

### UNIFORM HIGHWAY SIGNS.

#### Already Adopted by Five States—Modifications of Connecticut and New Jersey Signs Recommended for Country-Wide Adoption.

The idea of having uniform highway signs, both direction markers and precautionary signs, throughout the country was advocated by a committee of the American Roader Builders' Association at its recent convention. The committee consisted of R. A. Meeker, T. J. Wasser and J. L. Bauer. The committee reported that five states have adopted standard signs, these being Connecticut, Massachusetts, New Jersey, New York and Pennsylvania. A committee of the New Jersey Association of County Engineers had recommended that the sign adopted for Connecticut be made the standard for New Jersey also with certain modifications; and the



In the precautionary signs the word "Danger" is red, the rest is black on white. In the direction marker the colors are white and cobalt blue.

ROAD SIGNS RECOMMENDED FOR NEW JERSEY STATE AND COUNTY HIGHWAYS BY N. J. ASSOCIATION OF COUNTY ENGINEERS.

committee of the Road Builders' Association in turn recommends that this same sign be used, as a basis at least, for a national standard.

The standards as adopted for New Jersey are shown on the accompanying illustration. The most prominent feature of this is the use of the arrow in both direction and precautionary signs. In the direction marker the name of the most important town on the route is shown conspicuously within the arrow, and two intermediate towns are named less conspicuously on the sign. This marker is to be 15 inches high and 36 inches wide and constructed of wood or metal. Smaller arrows are shown in front of the names of the two towns or cities above the main arrow. The Road Builders' committee recommends that there be added to this sign the words "This is —," giving the name of the town in which the sign is placed; also that the arrow shall be cobalt blue.

The precautionary signs as adopted for New Jersey differ from the Connecticut sign in that, where the New Jersey sign gives the distance in feet to the danger point (which is to be 500 feet wherever possible), the Connecticut sign has the word "ahead." Where the sign denotes a dangerous curve, this is indicated by a curved arrow, the head of the arrow on the left indicating that the curve turns to the left and vice versa. The Road Builders' committee would add to this description that the word "danger" on the precautionary signs shall be in vermilion and all other parts of the sign in either black or white. It also recommends that these signs be used only in the open country.

The chief argument for adopting standard signs is that, with the great increase in variety and number of private signs, it is difficult for the automobilist to locate quickly the sign of the highway department which gives

him the information or the caution for which he is on the lookout, unless he knows exactly what shape, color, etc., to look for. A great deal will, of course, be accomplished when a standard is adopted for all of the signs in any one state; but there is now so much touring that embraces a great number of states, that the benefit will be increased by adopting a standard that will be used by all of them. It will, of course, be necessary to prohibit by law the use by private parties, for advertising purposes, of signs that bear anything like a close resemblance to these standard signs.

## TRUCK TRANSPORTATION OF LABORERS AND MATERIALS.

### Results and Costs on Work Done by Federal Health Authorities at Macon, Georgia.

By W. E. HARDENBURG.

Transportation of laborers and materials by trucks was found to be considerably cheaper than transportation by rail on a large drainage and construction job at Macon, Ga., completed last fall under the auspices of the city of Macon, Bibb County, Georgia, and federal health authorities.

From January 1 to November 15, approximately \$3,825 was spent on truck transportation, of which \$510 represented hire of trucks used in addition to those owned and operated by the city of Macon, the county and the government. The balance, \$3,315, represented the costs of upkeep and operation of two trucks for seven months and two more trucks, for five months, or, let us say, of two trucks for twelve months. On this basis, the monthly cost of operation of the two trucks was \$276, or per truck \$138.

Of the total of \$3,315 spent on the trucks, wages of the truck drivers represented \$1,560; gasoline and oil, \$830, and repairs, \$925. Of the monthly cost per truck, \$138, wages took \$65; gasoline and oil, \$35, and repairs, \$38.

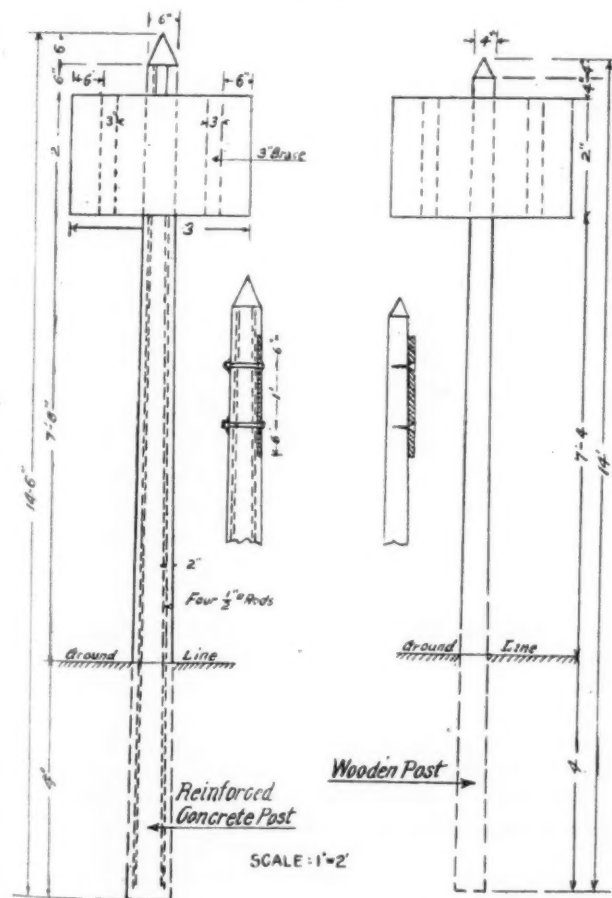
It is believed that 25 miles per day would be a very conservative estimate of the average daily run of each truck. This would be a monthly mileage of \$650 per truck.

From these figures, not allowing for depreciation, the average cost of operation per mile was 21 cents. Dividing this into its component parts it was found that wages amounted to 10 cents per mile; gasoline and oil, 5.3 cents, and repairs, 5.8 cents.

A comparison of truck and rail costs of transporting laborers to and from their work was made. It was found that to carry one laborer to and from his work—an average distance of five miles—the cost by rail was 30 cents per day. As each truck would carry 20 or more laborers to and from their work in approximately half an hour and as the total daily cost of truck operation was only \$5.31, based on a ten-hour day, it resulted that each laborer was carried for 2.65 cents daily.

On one portion of the job, laborers at first were sent to their work—a distance of about two miles—on street cars at a cost of 12 cents per laborer per day. Later, these laborers were carried to their work in one of the trucks at a cost of about 1 cent per laborer per day.

Another advantage of the trucks in this connection was the fact that the trucks generally were able to convey the laborers to the exact spot at which they were to work, while trains generally left them at a point several minutes' walk from the job.



SIGN POSTS RECOMMENDED FOR NEW JERSEY HIGHWAYS.



It was possible most of the time to keep the trucks busy the rest of the day hauling materials, dynamite, mosquito oil, etc., and transporting foremen and inspectors from one part of the job to another. Even though it had been impossible to utilize the trucks for anything else, the figures indicate that it would have paid to keep them for the transportation of laborers alone, as transportation of 20 men by rail would have cost \$6.00 daily as against the \$5.31 that it cost to run the trucks; and this cost would have been less had no other work been done.

While, on a mileage basis, rail transportation of materials was somewhat cheaper as a rule than transportation by trucks, the fact that the trucks obviated the delays consequent on rail transportation, and also took the materials much nearer to their ultimate objective, effected economies in time which more than counterbalanced the cheaper rail rate per mile.

The trucks in question were one-ton Ford trucks which cost about \$800 each. Considering the very difficult terrain in which they were operated—swamps, rough plantation trails and sand beds—it is believed they did fairly well.

Unquestionably, costs would have been greatly reduced had it been possible to obtain qualified drivers. As it was, inexperienced and unreliable men, mostly negroes, were employed for this work. These persons would experiment with the machines, run them too fast and fail periodically to report for duty, entailing a big truck-driver turnover. It is believed that repair costs would have been halved had qualified men been running the trucks.

#### CODE LETTERS AS HIGHWAY REPORTS.

We have received from the Texas State Highway Department the following letter:

March 8, 1919.

TO THE STATE HIGHWAY COMMISSION.

1	RARHLRRALQ	RRQRRVLRW	RRMNYNRYRY	BARAAAAEER	AHHYYRYBBR	50
51	AYYHVRNLHR	PGARALLAFY	YAABAGARLY	AYAARBIAEB	YNFAAABBBB	100
101	NAHEBAARAA	ARBAAAMAAR	LAAAAYYAAR	BAARBAAAAA	AHMBARARLO	150
151	QKGAAGARNB	BAAARRABAA	AHRABAAAAA	AAAARARAAA	AAAAAAAHBG	200
201	AGQAAABPZR	RNBAACAABA	BAZZBAHWO	ZAACRNAAAA	AAAAZZZZAA	250
251	NAAAAALNHZ	YBAAABAADB	ABANANAAAA	ZAAAAAARA	AARNRAAAAA	300
301	AAAAARARAA	AAAAEHAARG	BAAACACAB	AAAAAAAAM	BRNCABAAGA	350
351	AAAAAAEDAA	NAAAAAYAAA	AAAAAATAAA	BBAAAAAA		400

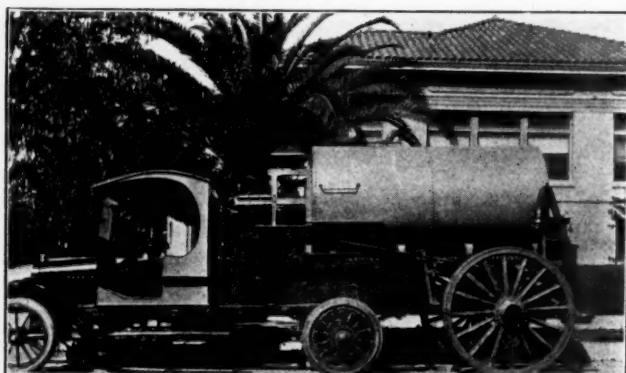
This is a code letter sent by George A. Duren, state highway engineer, for giving in condensed space information concerning the status of each highway job at the date of the report. As there are 389 jobs, it is evident that to give even a few words about each would require much more space than this.

The plan is very simple. The first letter refers to Job

No. 1, the second to Job No. 2, etc. Fifty jobs are referred to on each line. The number at the left of each line is that of the first job referred to in that line, and the number at the right, the number of the last job on that line; these being given to facilitate the locating of jobs. The letter itself gives the information, by reference to the key below:

A—Application incomplete.  
 B—Application complete.  
 C—Plans received; application incomplete.  
 D—Plans received, application complete.  
 E—Plans returned for correction.  
 F—Revised plans received.  
 G—Plans approved.  
 H—Federal Aid Plans forwarded.  
 I—Federal Aid Plans returned for revision.  
 J—Revised Federal Aid Plans forwarded.  
 K—Federal Aid Plans approved.  
 L—Letting advertised.  
 M—Bids rejected.  
 N—Contract awarded.  
 O—Contract executed.  
 P—State Project Agreement executed.  
 Q—Federal Project Agreement executed.  
 R—Work started.  
 S—Work suspended.  
 T—Work renewed.  
 U—Work complete.  
 V—Work accepted.  
 W—Final estimate paid.  
 X—Final reimbursement received by Federal Government.  
 Y—Project suspended or dead.  
 Z—Spacer or filler or County Road Map.

To illustrate: Job No. 1 has the letter R meaning work has started on it. Job No. 2—A, application incomplete. Job No. 61—P, state project agreement executed. Job 361—N, contract awarded. The above key



ANAHEIM'S SPRINKLER TRUCK.

#### ANAHEIM'S SPRINKLER TRUCK.

Five or six months ago the city of Anaheim, California, began using the sprinkler shown in the accompanying illustration. The equipment consists of a 2-ton Ford truck and an ordinary sprinkler wagon attached to it with a fifth wheel and pillow block. The lower half of the fifth wheel was fastened near the rear of the truck, and by removing the front truck of the sprinkler wagon and placing the upper half of the fifth wheel on the lower half, a six-wheel apparatus is obtained which is easily handled and has been found to be very efficient by the city engineer and superintendent of streets, O. E. Steward, to whom we are indebted for this information and photograph.



When the sprinkler is not in use, the front end of the wagon is jacked up, the king bolt removed, and the truck is ready for use as a truck, as the lower half of the fifth wheel does not interfere with the placing of the body on the truck.

The truck is equipped with an internal gear drive, a Torbenson axle, and a Moore auxiliary transmission. This equipment gives ample power and a great variety of speeds. When sprinkling, the apparatus is driven at a speed of about  $3\frac{1}{2}$  to 4 miles per hour. The sprinkler heads can be opened to give sufficient water for greater speed if desired. When traveling empty, or full to the street for sprinkling, the speed is 10 to 15 miles per hour.

Mr. Steward finds that this equipment delivers upon the street twice the quantity of water that the same driver was able to place by the use of a good horse-drawn sprinkler. If for any reason a horse-drawn sprinkler is desired, a few minutes' work places the front trucks on the wagon and it is ready for that work.

The sprinkler heads are opened by handles placed conveniently just back of the rear opening in the truck cab.

This apparatus complete, truck, truck body, and sprinkler wagon, cost the city of Anaheim about \$1,900.

## OBTAINING SEWAGE FOR EXPERIMENT STATIONS.

### Removing It from Sewer by Bucket Elevator so as to Secure Characteristic Suspended Matter Content—Removing Grit.

In the issues of this paper for October 12, 19 and 26, 1918, we published a description of the experiments made in New Haven on the treatment of sewage by the Miles acid process, as written by Prof. C. E. A. Winslow, the chairman of the committee, which had the matter in charge. The complete report of the committee has been made public, and contains a number of other points of interest. One of these is the method of obtaining the sewage that was used in the tests, which is described in the report as follows:

**Bucket Elevator.** In most stations with which we are familiar, the sewage for experimental purposes has been withdrawn from the sewer by pumping. Such a procedure is unsatisfactory, however, particularly for studies which include screening, since it is difficult to obtain a fair and normal representation of the actual sewage flow by the use of a small pump. The surface solids containing floating material and grease are not fairly represented and the suspended matter is broken up so as to make screening investigations unreliable. It was finally concluded that a bucket elevator would be the most satisfactory form of apparatus for obtaining a representative and unaltered sewage for experimental purposes.

An elevator such as we desired could not be purchased ready made, but the various parts were finally obtained from several manufacturers and the structure assembled. In order to form a proper base for the elevator, the invert of the sewer was extended out to one side, in the form of a flat slab of reinforced concrete 12 inches thick, 6 feet wide and 10 feet long. This slab rested on the piles which supported the sewer. A masonry wall was built up around the edge of this slab, forming a water-tight forebay at one side of the sewer. The elevator was erected in this forebay, and after the elevator was complete two openings were cut from the forebay into the side of the sewer. These openings

were each three feet wide and extended down to the invert of the sewer. A galvanized iron deflector built out from the lower side of the upper opening nearly to the center line of the sewer deflected a large fraction of the sewage flow into the forebay through the upstream opening, the sewage passing out of the forebay back into the sewer through the lower opening. The level of the sewage in the forebay, like that in the sewer itself, would rise and fall with the tide, but the composition of the sewage was not materially changed.

The elevator was built on a heavy frame of 6 by 8-inch timbers 8 feet long by 5 feet wide. The chains were in parallel, with the buckets fastened to them at every sixth link. The chains passed over two sets of sprocket wheels at the top and one set at the bottom. The larger sprocket wheel at the top, 24 inches in diameter, with 19 teeth, was on the same shaft with a large 60-inch gear with 125 teeth, which in turn was driven by a pinion 6 inches in diameter, with 12 teeth. The pinion was mounted on the same shaft with a pulley 38 inches in diameter, with 4-inch face, which was belt-driven from a 5-horse-power motor with a 4-inch pulley. The motor ran at 1730 revolutions per minute, the pinion at 182, the large gear at 17.4. As a bucket was fastened to each sixth link, and the drive sprocket had 19 teeth and ran at a rate of 17.4 r.p.m., the number of buckets discharging per minute was 55. There were in all 18 buckets on the chain. Each bucket had a total capacity of 2.64 gallons, but by the time the sewage was discharged 20 per cent had been lost by splashing, so that  $55 \times 2.64 \times 80 = 116$  gallons per minute or 167,000 gallons per day, represents the amount actually delivered by the elevator. The buckets were submerged to within 3 inches of the bottom of the forebay, and rose vertically through the current of sewage. The bottom of the forebay was at elevation -3.6 and the buckets discharged at elevation +13.9, giving a lift of 17.5 feet. The buckets discharged the sewage into a galvanized iron hopper suspended between the two upper sprocket shafts. From this hopper the sewage flowed by a wooden flume to the plant.

On the whole the operation of the bucket elevator proved very satisfactory. Some difficulty was experienced when stones lodged under the buckets and knocked the chains off the lower sprockets; and during the first severe cold weather the spray froze solidly around the upper part of the structure, putting the apparatus out of commission for several days. After this the entire structure was boarded up, and the warmth of the sewage proved sufficient to prevent freezing. A great deal of trouble was caused by wet belts, but as it was impossible to avoid this difficulty without changing the location of the motor and lengthening the shafting, new belts were used as soon as the previous ones had been weakened by moisture. The sewage was not churned violently by this apparatus and a very representative sample was obtained. Oil, paper and feces were brought up and discharged in about the same condition and amount as in the flowing sewage. The cost of operating this elevator was much greater than the cost of operating a centrifugal pump would have been, but since the work was experimental, it was considered that a representative sample of sewage was more essential than economical operation.

**Grit Chamber.** The sewage flowed from the top of the elevator to the station through a wooden flume six inches wide by six inches deep, with a slope of 1 to 100. Before reaching the distribution box it passed through a grit chamber. This grit chamber had two compartments, which could be used alternately. Each com-

partment was 15 feet long, 12 inches deep at the inlet end, 4 inches deep at the outlet end, and 4 inches wide, which gave a detention period of 0.24 minute. The velocity of the sewage was checked to 0.7 foot per second at the inlet end, increasing to 2.1 feet per second at the outlet end. When much storm water was mixed with the sanitary sewage, this grit chamber proved inadequate, so that supplementary grit chambers were installed for the sewage delivered to the activated sludge and Miles acid tanks. Our experience with this first grit chamber proved that where the combined system of sewage is in use it is very essential to have reserve grit chambers which can be used when storm water sewage is being treated. Unless ample grit chamber space is available, the settling basins will receive a great deal of inert mineral matter, which will lower the value of the sludge in processes where sludge recovery is an essential step.

*Weir Box.* The usual method of measuring the sewage used in experimental work is by means of orifices. In our experiments it was obvious that this method would not be satisfactory, since large particles of suspended solids would quickly clog the small orifices necessary, and, if constant head were maintained by an overflow, the floating matter would be carried over the waste weir and would not be drawn into the currents of sewage passing through the submerged orifices. Movable weirs were therefore used instead of orifices, and, after the

weirs were adjusted to the quantity of sewage required for each process, a constant head of sewage was maintained over them by an automatic head-regulating device. Since some experiments required as little as 10,000 gallons per day or 7 gallons per minute, we used for these processes 60° V-notch weirs, so as to obtain a greater width of crest for a given discharge than could be obtained with a rectangular weir. This was desirable, in order that the weir might not be frequently clogged by paper or feces.

The head regulating device consisted of a float in the weir box, with a vertical spindle at its center which operated a needle valve. This needle valve controlled the flow of city water to a small brass cylinder, in which was a piston which opened and closed a butterfly-valve in the raw sewage flume. As the level of sewage dropped in the weir box the butterfly-valve was opened by the piston, and as the level increased the valve was closed. After proper adjustment, and with some attention, this apparatus, constructed by Wallace and Tierman of New York, maintained the head of sewage in the weir box constant within one-sixteenth of an inch.

The weir box was 27 inches square by 8 inches deep. The weirs were all attached to a weir plate at one end of the box. Three 60° V-notch weirs were used for the Imhoff, activated sludge and Miles acid processes, and one rectangular weir, 7½ inches wide, for the screening influent. All weirs were calibrated by volumetric tests.

## SEWERAGE OF LEOMINSTER, MASS.

### Treatment in Tanks with Some Novel Features, Followed by Sprinkling Filters—One of Four Units Designed for City of Twenty Thousand Population—No Sludge After Ten Months' Operation.

Leominster, Massachusetts, became a city in the year 1915, when the population was about 18,000. Since then it has grown to approximately 20,000 population. It occupies an area of about 15 sq. miles, but only a small part of this is thickly built up. There are altogether something over 100 miles of streets and roads within the city limits, but the 31 miles of sewers which have been built reach a majority of the population. Three small streams and the Nashua river, into which these sewers discharge, pass through the town, and about fifteen dams on these various streams are used to furnish power for manufacturing plants. The sewers discharge into these streams at a number of points.

Several years ago the State Board of Health called upon the city to treat the sewage so as to reduce the pollution of the streams, and after considering two or three plans for sewage treatment, the City Council in 1917 authorized a contract for a sewage treatment plant on the Starr system, to treat the sewage of one section of the city, to have a capacity for 4,000 population. Preliminary studies had been made, and the decision reached that it would be cheaper to install four plants at different points in the city and bring the sewage from the various outlets to these than it would be to concentrate all of the sewage at one plant. Construction of this one plant was begun in the fall of 1917, and continued through the severe winter of 1917-18, and the plant was put into operation in May, 1918.

The plant was designed by Oliver F. Starr (who is now sanitary engineer on the staff of Ford, Bacon & Davis, engineers) and consists of two units built in duplicate, each consisting of a culture tank, a reduction tank, a siphon tank, a siphon chamber, and a sprinkling filter. The sewage enters the culture tank at one end,

passes under a baffle wall that extends from the roof to about mid-depth of the tank, and leaves the tank by passing under another baffle wall and through an outlet pipe. This effluent passes through a smaller reduction tank, where it passes under a suspended baffle and over a second baffle rising from the bottom to near the surface of the liquid, and passes out through a slightly submerged outlet pipe. The liquid then flows through the siphon tank, which is filled with pieces of stone of about 4 to 8 inches in diameter, then passes through the open joints of a brick wall into the siphon chamber, from which the siphon discharges the effluent intermittently upon the sprinkling filter bed.

Each of the two sprinkling filter beds is about 70x110 feet, and contains 117 nozzles, placed 8 feet apart. From the sprinkling filter the effluent passes directly to the river.

Each culture tank has a hopper bottom, with an outlet from the low point into a sludge pipe controlled by a valve, the stem of which extends through the roof of the tank. Each reduction tank has a bottom divided into two hoppers, the low point of each of which is connected to the sludge pipe. The whole tank is constructed of concrete, and is entirely roofed over with a concrete slab in which several manholes are placed.

The tanks were constructed at the foot of a bank of fine sand and gravel, and the excavation for the tanks, which are 19 ft. deep at their deepest point, extended into running sand and water, which gave considerable trouble, especially on account of the extremely cold weather, during which pumping had to be continuous night and day. Although the concrete work was done during very cold weather, continuously below freezing and often below zero for days at a time, all of it which



can be seen is in excellent condition, reflecting great credit on those who had charge of the work. Careful examination revealed no places in the concrete which showed any evidence of freezing, or where the surface of the concrete was not in perfect condition.

The plant is located on a farm which had been bought several years before, when it first became evident that sewage treatment would be necessary, and now the previous owner rents the farm from the city. When the

in these tanks other than fine sand or grit brought down by the sewers.

Only about 1,000 people are at the present connected with this plant, and but one-half of it is in use. In fact, although both tanks were completed, the stone has not been placed in one of the two sprinkling filters. Either tank can discharge into either filter, and from May until about the first of October the north tank was used, discharging onto the south filter. At this time

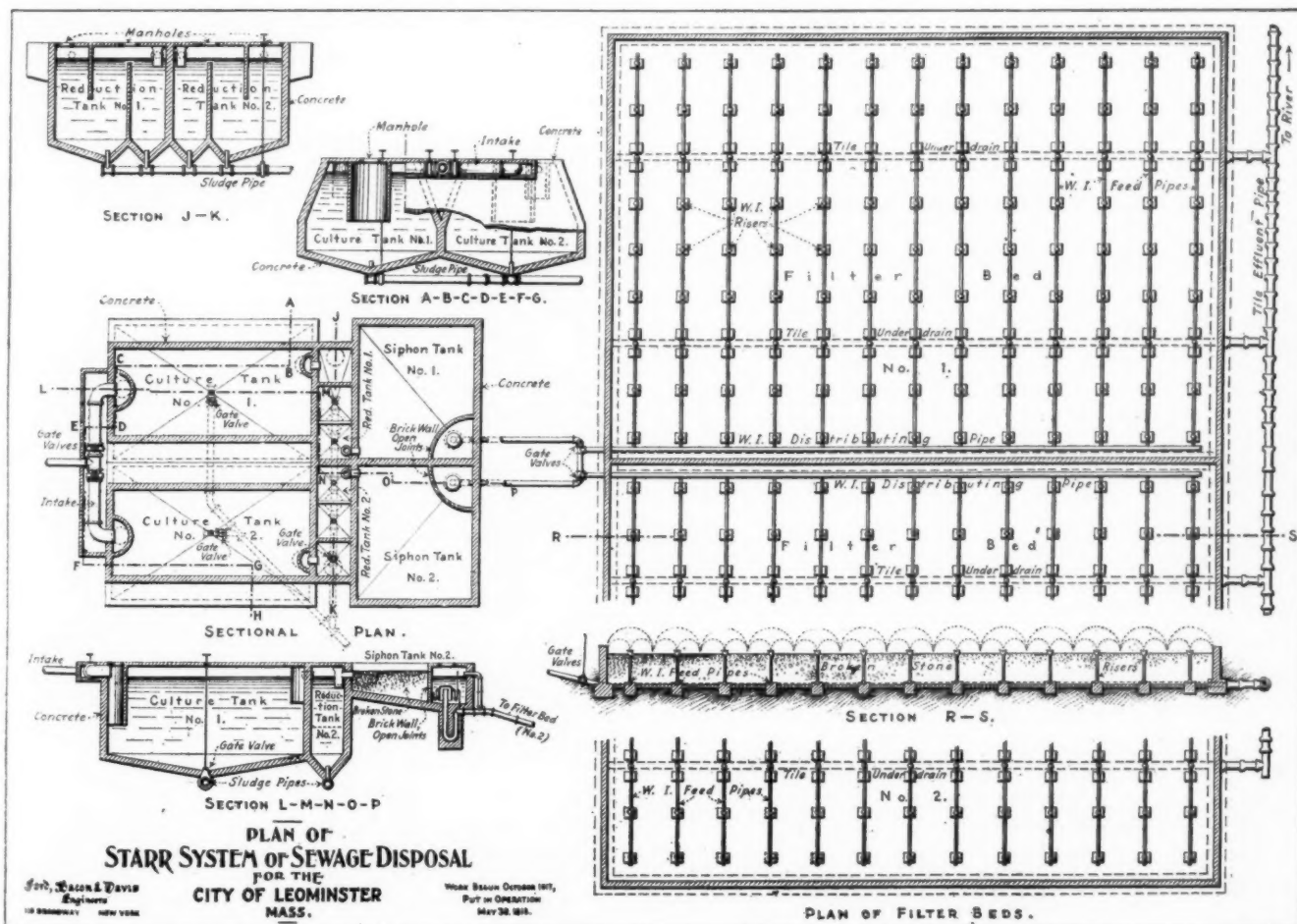


GENERAL VIEW OF PLANT.

Top of tanks in foreground, sprinkling filters in background.

plant was completed an arrangement was made with this previous owner, and he now receives \$10 per month to look out for the plant for the city. His duties consist of a daily visit and an infrequent cleaning of a sprinkler nozzle. This is the entire cost of operation of the plant. On two or three occasions the valves of the sludge pipes have been opened, but there was no indication of any accumulated sludge, only clear sewage being discharged. Mr. Starr, the designer, states that no sludge will collect

the flow was changed over into the south tank, as this gave a little more head on the filter. There was then about two feet of scum on the north tank. When the change in tanks was made, the sewage and scum were left standing in the tank then used. When visited by the writer on March 14, the scum had almost entirely disappeared, there being only about an inch of floating, non-cohesive matter, on the surface. On the south tank, which has been in use five or six months, there was



PLAN OF LEOMINSTER SEWAGE TANKS AND SPRINKLING FILTERS.

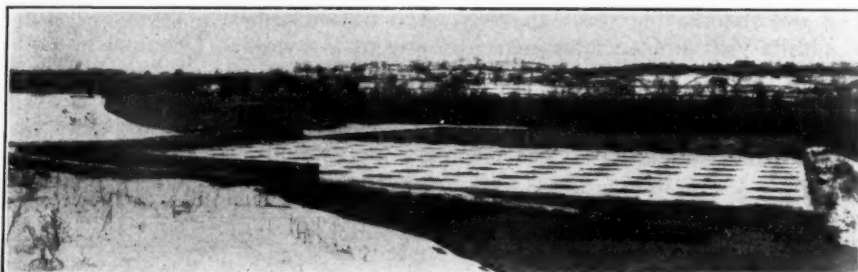


perhaps a foot of rather soft scum. As already stated, there was apparently no sediment in the tank.

The sprinkling filters are provided with Gault nozzles. It was found that there was not sufficient sewage to operate one sprinkling filter for any considerable part of the time, the nozzle discharge occurring about once in fifty minutes and lasting for only about four or five minutes. The infrequency of discharge caused some apprehension on the part of the city officials, who, having in mind the intensely severe weather of the previous winter and fearing that this would result in the freezing of the undischarged effluent in the top of the riser pipes between discharges, caused a hole about one quarter-inch in diameter to be tapped into each riser pipe, about two feet below the filter surface, in order to drain the riser down to that level after each discharge. It seems to the writer that this was a mistake, for a considerable amount of sewage must escape through these openings while the nozzle is discharging, the effect being to both reduce the head on the nozzle and to permit the escaping sewage to follow down the outside of the riser pipe to the bottom of the bed, thus receiving no beneficial action from the filter. Probably because of these holes, the spray does not at present cover the entire filter, but owing to the small amount of sewage this is not a serious matter.

#### SPRINKLING FILTERS IN WINTER.

Snow is seen on the finished filter; the riser pipes of the unfinished filter are seen beyond. At the left is the sand bank into which the plant extends, and a low board fence around the filter bed to prevent sand blowing onto the filter.



Owing to the small size of the city and of the plant, no chemist has been employed to look after it. A sample of the effluent was sent a short time ago to the city chemist of Boston, but unfortunately the container was broken in transit. On March 9th, samples were taken once an hour for 24 hours, and the composite sample was analyzed by the chemist of the sewage disposal plant at Fitchburg, about 5 miles away. This analysis, in parts per million, is as follows:

Albuminoid ammonia—total .....	1.000
“ “ dissolved .....	0.900
“ “ suspended .....	0.100
Nitrites .....	0.955
Nitrates .....	0.000
Chlorine .....	29.2
Oxygen consumed—total .....	118.0
“ “ dissolved .....	79.0
“ “ suspended .....	39.0
Residue on Evaporation—total .....	260
“ “ volatile .....	130
“ “ fixed .....	130
Dissolved solids—total .....	242
“ “ volatile .....	122
“ “ fixed .....	120
Suspended “ total .....	18
“ “ volatile .....	8
“ “ fixed .....	10

At the time of his visit the writer could detect no odor from the tanks, even when the manhole covers were removed, and that from the filter when sprinkling was hardly perceptible when standing at the lee edge of the filter bed, and no complaint has been made by residents living a short distance away. Absence of odor, low cost of installation, and nominal cost of maintenance were referred to appreciatively by the mayor, Henry F. Sawtelle, and the city has taken up with the engineers

the matter of design of the other units upon the same system, and expects to proceed with construction as soon as price conditions become favorable.

### SNOW SURVEYS OF WATER SHEDS

#### Methods Used by State Department of Engineering of California.

In the northern sections of the country a very considerable part of the run-off from catchment areas comes from the thawing of snow, and the volume of the spring freshets is limited and to a certain extent determined by the amount of snow lying on the ground when the spring rains come. The intensity and duration of individual rains, the depth of frost in the ground, air temperature at the time, etc., all have their effect upon the freshet volume, but in general the freshets will be light if there is little snow lying on the ground.

Determination of the depth and saturation of snow on the catchment area is desirable as giving a basis for forecasting freshets, and for other purposes also. For instance, if a waterworks reservoir is low but there is abundance of snow, it is not nearly so necessary to limit consumption and conserve the supply as it would be if there were only a light accumulation of snow on the

area. Snow surveys are made regularly by several waterworks superintendents, the results obtained at Salt Lake City having been described by Municipal Journal in the issue of November 26, 1914.

The state Department of Engineering of California makes such surveys in a most thorough and systematic manner; and though they are made with reference to irrigation, the procedure is the same as though for municipal water supply. A description of the methods and appliances used is given in the annual report of the department, which description, together with a discussion of the value of the survey, is given herewith.

The Department of Engineering in co-operation with agencies of the federal government, is measuring the quantity of water flowing in the streams at all times, and conducting research into the uses of water. It is known now with a fair degree of accuracy the average quantity of water discharged by the principal streams of the state every year, as well as the maximum volume of flood waters that are likely to be produced at any one time.

It is contemplated that ultimately reservoirs will be built in the mountains to retain a portion of the floods, so as to reduce the quantity to be cared for by the flood-control works in the valleys. This same water will then be used for irrigation and other purposes.

But it will be necessary to know beforehand when to begin filling the reservoirs. If they should be filled with early flow of water before it has reached flood stage, and then a flood came, there will be no place to store any of it. On the other hand, if they are held empty until flood danger is past, there may not then be enough to supply the needs of irrigators and other users.

Every artificial reservoir is accurately measured and gages show every day the quantity of water they contain, but nothing is known of the quantity back of them which is yet to come. The source of all floods and of the major part of the late-season flow is the vast snow fields about the heads of the streams.

The department holds, and has so pointed out in previous reports, that surveys of these great snow-field reservoirs should be made and the water content ascertained. From the information obtained, a forecast can be made of the quantity of water that will come down when the snow melts. Such information will be valuable, not alone in directing the operation of filling artificial reservoirs, but in giving foreknowledge of the summer flow, so that the farmer may conduct his irrigation to meet conditions. If it is known at planting time that there will be a shortage of water in June and July, crops will be planted which will not need water at that time and the limited quantity will be saved to mature fruit or other products requiring late application.

To make the prediction reliable, it is necessary to know something of the meteorological conditions prevailing before and at the time the snow was deposited. It is essential to know whether the ground was dry or saturated; whether it was warm or frozen, and many other meteorological phenomena which affect the melting of the snow.

A comprehensive snow survey then requires the use of instruments for recording precipitation, temperature, humidity and wind, as well as the water content of the snow. In the latter connection, it should be remarked that the mere measuring of snow gives no information of value. A foot of snow at one time may produce nearly a foot of water and at other times (and conditions) ten feet of snow are required for one foot of water.

The apparatus used in the determination and studies are several, and most of them must be self-recording.

A meteorograph set up and running requires attention only once a week (or longer, according to its construc-

tion), when the record-sheet must be changed. It contains a rain gage, thermometer, hygrometer and anemometer, each of which makes a continuous record upon one sheet of the precipitation, temperature, humidity, and the force and direction of the wind. The whole apparatus is inclosed in a shelter-house about four feet square.

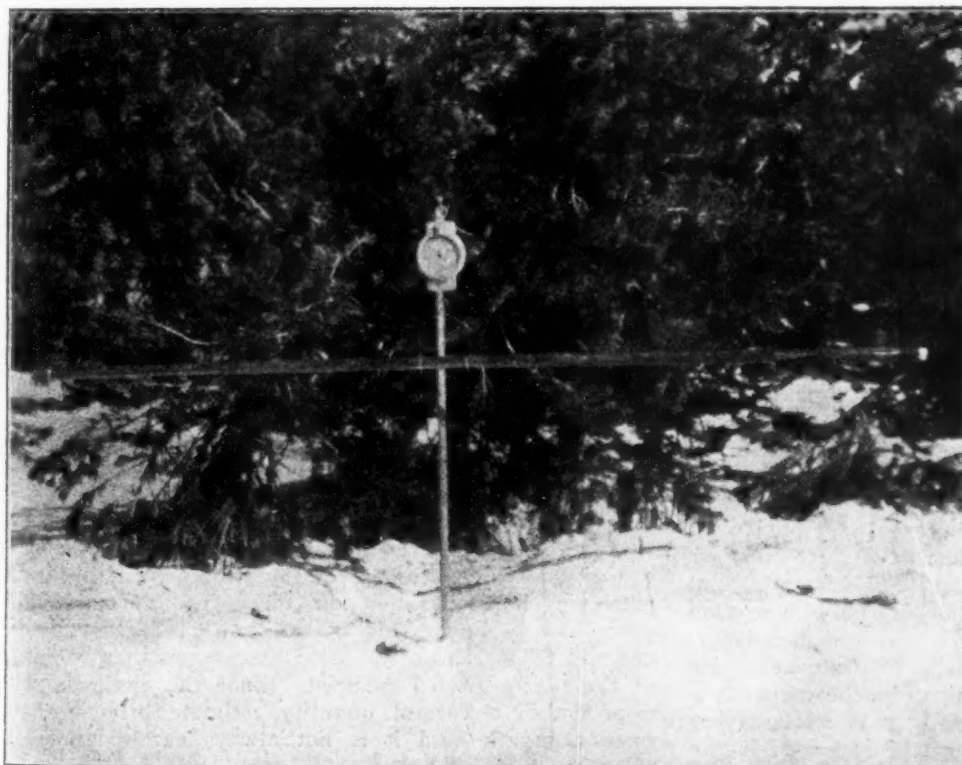
A snow-sampler consists of a light jointed metal tube, with a cutter at one end for penetrating ice or compact snow, a scale with supporting staff to weigh the sample of snow.

To conduct a snow survey, a meteorograph, or better more than one, if available, is set up in the field before the snows begin to fall. Regular visits are made to inspect and adjust the apparatus and change the record-sheet. After the last snowfall, and before spring thawing has set in, the snow is measured. Courses are laid out in selected portions of the field where average conditions prevail. With the tube a sample of snow from surface to bottom is taken and the amount of water it contains is found by weighing. The scale is graduated to read direct the inches in depth of water the column of snow will produce.

By taking a great many samples on a course and having many courses laid out, distributed well over the field, a close estimate is made of the quantity of water held in storage in that field. With the result of the samplings and the knowledge gained from the meteorograph records, a fairly accurate prognosis of the progress of melting snow and resulting water flow may be made.

It is only recently that meteorologists have taken up the study of snow in its relations to the precipitation of water it represents. They have been content with reporting the depth of snow from time to time and assuming that it represents a certain amount of water.

Professor J. E. Church, Jr., of the University of Nevada, has probably given more scientific study to the subject than any other man in the United States, if not in the world. From a pure regard of the scientific aspect,



SNOW SURVEYING INSTRUMENT AND SNOW SURVEYOR.



and a love of nature which finds delight in communing with her in all her moods, Professor Church has prosecuted his investigations for some years, mostly alone, but more recently in co-operation with the local representatives of the U. S. Reclamation Service and the U. S. Weather Bureau.

Although convinced that the study of snowfall in its relation to stream flow is of great importance and that it is one of its proper functions, the Department of Engineering has heretofore had neither apparatus nor funds with which to make the investigations.

The legislature two years ago authorized the department to engage in this line of research, but the act did not become effective in time to do anything last winter. Upon taking up the subject, it was found that some of the instruments required are not made by any manufacturer and can only be obtained by having them made to order. Under war conditions, it was found impossible to have this done.

Fortunately, however, through the good offices of Professor Church, the department has secured enough apparatus (and practically all there is in the United States) to enable investigations to be made upon the headwaters of about seven of the principal streams of the Sierras, four of which run into the Sacramento and San Joaquin valleys, and three into the irrigated districts of Nevada.

Tentative agreements have been made for the co-operation of the United States Forest Service, U. S. Weather Bureau and Reclamation officials, as well as of some large users of water in the territory named.

Professor Church has generously placed his knowledge and experience at the service of the department, and it is felt that it is engaging upon a line of research that will result in very great good.

### WRAPPING GARBAGE.

During the past few years Municipal Journal has referred on several occasions to the practice adopted by different cities of requiring the householders to drain the garbage produced in their homes and wrap the same in paper before depositing it in the garbage pail. With a view to learning whether this continued to be satisfactory, we wrote to two of the larger cities, Minneapolis and Trenton, asking whether the practice had still continued.

From F. W. Cappelen, city engineer of Minneapolis, we learn that that city continues the practice of wrapping, although the garbage is no longer burned in the incinerator but is now being fed to pigs under contract. The contractor would prefer to have the wrapping omitted, but the citizens have become so convinced of the desirability of wrapping that there would now, apparently, be more difficulty in persuading them to discontinue the practice than there was originally in securing the adoption of it. The garbage there is being collected as before and placed in tanks on flat cars at a central loading station, from which it is hauled by the contractor to the pig farm about six miles from the city, the contractor paying the city \$1.26 per ton for the garbage.

Trenton also continues to collect garbage under an ordinance that requires the citizens to wrap it in paper and the officials regard the plan as very successful and report that the people are very well pleased with it. One of the arguments for adopting this was the belief that it would increase the effective capacity of the garbage incinerator, and this has been found to be the case. It is found that the wrapping of the garbage effects a saving of about 20 per cent in the amount of coal used in the incinerator for destroying the garbage, this being due

chiefly to the absence of water from the pails, for the water must be drained out before the garbage can be wrapped. At present there are eight wagons drawn by horses collecting garbage three times a week. The amount of collection is about 35 tons a day, but during the summer months it runs about seventy to eighty-five tons. The superintendent of collection, John McClain, states that there are, he believes, twelve other cities in the country that require wrapping of garbage.

### COST KEEPING FOR HIGHWAY CONTRACTORS.\*

#### Suggestions for Making Daily Estimates of Unit Costs—Lost Time—Daily Overhead—Installing and Shifting Plant.

By HALBERT P. GILLETTE.

Last September the Office of Public Roads, Washington, D. C., published a 52-page pamphlet entitled "Highway Cost Keeping," by Tobin and Losh, U. S. Engineer Economists. This pamphlet can be had for 10 cents, and as it should be secured by every highway contractor and engineer, it will be unnecessary to repeat in this paper anything given in that pamphlet.

Although several books and a great number of articles on cost keeping have been published during the last ten or twelve years, there still exist many contractors who apparently agree with the old time contractors who said: "The only cost keeping that I need is what my banker does for me. If his records show that I have a larger bank balance after the final payment on a contract than when I started it, then I am satisfied with my men, my methods and my luck. But if my bank balance is smaller at the end of the job, to h— with my luck, my methods and my men."

This is the attitude of many practical men, but to all such a word of advice may prove helpful. While luck cannot be changed by having a suitable system of cost keeping, it often happens that such a system leads to a change of it. Indeed the leading object in keeping unit costs is to find out the least costly way of doing a given kind of work and the most efficient bosses. Since this is the main object, it follows that an effective cost keeping system must show the unit costs at the end of every week, and if practicable, at the end of every day. But to accomplish this purpose it is usually necessary to cut out all hair-splitting, such as most accountants and bookkeepers indulge in. Rough and ready methods of estimating the number of units of work must frequently be adopted; approximate estimates of overhead costs must nearly always be used; and, in short, the aim must be to get at the unit costs within a few per cent—say 5 per cent—rather than "to the last red cent." It is that "last red cent" ideal of the bookkeeper that is accountable for the practical failure of many a cost keeping system.

As an illustration, take almost any dirt digging job and try to apply the usual bookkeeping methods to it. The timekeeper may report each day the day's labor cost of excavating, but he does not ordinarily ascertain the yardage of earth moved that day. Perhaps the engineer can give a rough estimate of the yardage, but his estimate may be 25 per cent off, for he usually makes his guess merely by looking at the map profile or at the cut and fill marks on the slope stakes and then looking at the partly graded roadbed. Since the engineer seldom makes a careful quantity estimate oftener than once a month—and it is not always careful then—it

\*Paper before American Road Builders' Association.



follows that there are very few grading contracts on which the cost per cubic yard of earth excavated is known within 10 or 15 per cent at the end of each week. As for knowing the earth yardage cost for each day, how many members of this association have ever seen a contractor who did know it?

#### ESTIMATING EXCAVATION YARDAGE DAILY.

For a long time the author regarded it as impracticable to estimate earth yardage costs with reasonable accuracy oftener than at the end of each week. Several years ago the author's brother, W. A. Gillette, devised a method of estimating earth yardage on grading jobs every day. The method consists in mounting a timekeeper on a horse and having him ride from gang to gang all day long, stopping 20 to 30 minutes at each gang. If a gang is excavating with fresno scrapers, for example, the timekeeper counts the number of fresno loads taken out by the gang in, say, 20 minutes, and he records the count for that gang. Then he rides on to the next gang which, let us say, is loading earth by hand into wagons. This gang is timed, for, say, 30 minutes, and the wagon loads are counted.

In the course of the day each gang is thus visited and its output counted several times. If, for example, gang No. 1 has been visited 3 times and during a total time of one hour it has turned out 50 fresno loads, it is then estimated that it would turn out 400 loads in 8 hours. An estimate is made of the average size of a load, and the total yardage output of gang No. 1 for that day is estimated. Similarly with the other grading gangs. At the end of the month the totals thus estimated are compared with a careful monthly estimate based on cross-sections. After a little experience it is possible thus to estimate within 5 per cent of the actual yardage moved.

Of course this intermittent count method can not be expected to give satisfactory results unless good judgment is used in its application. But it has been shown to the author's satisfaction that the method is sufficiently reliable when properly supervised. That it is simple is self evident.

The two greatest obstacles to the successful use of any cost keeping system are, first, a fairly accurate measurement of the number of payment units of work done each day, and second, a correct ascertainment of the total time lost or wasted by each gang. By "payment units" is meant the units of work for which price is paid, as, the cubic yard of earth excavation, the square yard of pavement, etc.

All costs should be finally reduced to so and so many cents or dollars per payment unit, so that the contractor can compare them with his contract prices. Fortunately the highway contractor has a relatively simple task in devising methods of measuring most of the payment units every day. Excavation measurements are the most difficult to secure daily, but a suggestion as to how this may be done has just been given. The yardage of pavement laid daily is readily ascertained. Since excavation and paving usually constitute the bulk of the cost of a road, it is evident that if a contractor can keep these two items of cost within his bid prices, he can usually "win out" on the entire job.

#### RECORDING LOST TIME DAILY.

Lost time is the bottomless pit into which more money has been dumped by road contractors than can be estimated. The author has seen, and has himself experienced, the bitterest disappointment resulting from time lost while wages were going on. It is not an uncommon thing to lay twice as much yardage of concrete on a day entirely free from delays as is laid on

the average day. In other words, it seems practicable to do twice as much work daily as actually is averaged. How is this ideal to be attained, or at least approximated? Only by system, and system involves keeping costs in such a manner as to locate definitely and immediately each period of lost time for each gang, and the reason why.

Does the crusher shut down for an hour for repairs? Then the time report for the quarry must show the time of stopping and the time of starting, and the reason for the shut-down. It should be the timekeeper's duty at the end of each week and of each month to summarize all the time losses in the quarry, so that the contractor or his superintendent can see at a glance the size of this loss. Perhaps no better way than this can be invented to demonstrate what extra parts should be kept on hand to minimize delays. Here it may be suggested that whenever a new machine is purchased, the manufacturer should be asked to recommend what and how many spare parts should be carried in stock by the purchaser.

Where the cost of lost time due to break-down is kept, it frequently becomes evident that it is economical not merely to have spare parts on hand, but to have entire spare machines. Take a pump, for example, that is delivering water to concrete mixer and for sprinkling, etc. Upon the service of that one pump will depend the progress of the pavement. Yet to save an investment of \$500 to \$1,000 in a spare pump, many a road contractor loses several fold that sum each year. Such losses result from failure to keep records that show the cost of lost time.

#### DAILY OVERHEAD COSTS.

Closely associated with the question of lost time is the question of overhead costs. Among "overheads" should be included superintendence, office expense, interest and depreciation on plant. Superintendence should include some compensation for the contractor's own time. To the author it seems desirable to divide the contractor's compensation into two parts, (1) salary and (2) profit. The salary should be only as large as would be paid to a skilled superintendent. The profit should cover both compensation for the contractor's skill as an organizer and financier, plus insurance against all risks for which an insurance policy can not be secured.

A common mistake in estimating "overheads" consists in dividing the annual overhead cost by the number of working days in a year, instead of dividing by the average number of days actually worked. In our northern climate the number of days actually worked by a given organization on road construction usually averages about 125, but there are 300 working days in a year; hence a highway contractor and his plant are usually idle nearly 60 per cent of the working days of the year. If a contractor's annual salary as a superintendent be added to the annual salaries of his permanent employees, and if this salary total be divided by 125, instead of by 300, the salary "overheads" per day worked will be ascertained for all practical purposes. Similarly as to plant "overheads" and office rental "overheads."

The total "overheads" per day actually worked must be apportioned among the units of work done. Both highway contractors and engineers who have not been accustomed to prorate overhead costs in this manner will get some surprises. Failure to do this is largely accountable for the fact that so many road contractors "go broke," and it also throws light upon the fact that a good many engineers think that road construc-

tion can be done more cheaply by day labor than by contract.

Having estimated the overhead costs per "day worked" (not per working day), some of these daily overheads can be assigned directly to a given class of work. Thus, the daily interest, depreciation and repairs on a concrete mixer can be assigned to the pavement. But certain of the daily overhead costs must be prorated to the different classes of work. There are several theories of prorating joint costs which the author has discussed at some length in the Handbook of Mechanical and Electrical Cost Data. Usually it suffices on construction work to prorate overhead salary costs in proportion to direct labor costs. Thus, if the direct labor cost of grading is \$50 a day and the direct labor cost of paving is \$100 a day, and there are no other direct labor costs, then one-third of the daily cost of general superintendence and office expense is assigned to grading, and two-thirds to paving. Having assigned all the daily overheads to the different classes of work, divide each assigned total by the number of units of work performed each day worked, to get the unit cost of overheads for each day. It should be noted that by using this method there are no overhead costs for the days on which no work is done, for all the overhead costs are assigned to the days actually worked each year on the average. While there are some objections to this method, it is the only method by which the total unit cost can be estimated with any degree of accuracy for each day worked. And it is highly important to have such an estimate in order to know whether a profit is being made or not. The average road contractor who has a unit cost-keeping system usually is deceived into thinking he is making money, because the daily overheads are either not known or are not properly allocated to the various classes of work.

#### COST OF INSTALLING AND SHIFTING PLANT.

There is another source of error in estimating daily or weekly or monthly profits which arises from failure to segregate the cost of installing, shifting and removing the various plant units, together with miscellaneous costs of getting ready to do work. It is rare that any contractor is able to state what these "preparatory costs" have been on any given job, and this holds true even where the contractor has a cost keeping system. No argument is needed to prove that unless the "Preparatory costs" are known, there is grave danger of underestimating the total unit costs.

Having so kept the daily records as to show the actual cost of moving and installing a crushing plant, for example, to this should be added the estimated cost of shifting it (where shifting will be necessary) and the cost of dismantling and shipping it home. Then this total should be divided by the total number of cubic yards of stone to be crushed on the given job, to get "the unit preparatory and shifting cost" of crushed stone.



This unit cost should be added each day to the "unit overhead cost" and the "unit direct cost" for that day. The resulting total will then be really significant as to what the pavement is actually costing.

#### IMPORTANCE OF DAILY UNIT COSTS.

It will be noted that the author is contending for the daily and weekly estimating of the total unit cost of each class of units upon which there is a contract price. Unless this is done it almost invariably happens that a road contractor who thinks he has been making a profit on a job awakens toward its close to find that he has actually lost money on it. Now, he may lose money on the job even if he does have complete unit costs before him every day, for it is very common to bid so low a price that no profit can possibly be made. But it is surprising what a difference there is in the energy of a desperate man as contrasted with one who is well satisfied. When a contractor realizes that he is daily sinking deeper into the quicksands of bankruptcy, he will usually "camp on his job" night and day, and his wits will be steadily at work; whereas if he thinks he is making a satisfactory profit, he is apt to take things easy, let well enough alone, go off on frequent pleasure excursions and the like.

Incidentally it may be remarked that one of the reasons why day labor so frequently exceeds the cost by contract lies in the psychological fact that the engineers and superintendents in charge of the work have no pecuniary stake in the cost of the work.

#### SUMMARY.

Summing up, a road contractor can use his brains to no better advantage than in finding ways of securing daily reports that show the total unit cost of every item on which he has bid a unit price. To do this it is frequently necessary to invent methods of securing approximately correct estimates of the number of units of work done, and it often pays to employ an engineer for no other purpose than to measure up daily the number of units. Lost time should be reported daily and its cost estimated. Overhead costs should be estimated per average day worked, not per working day, and unit overhead costs estimated every day. Plant, preparatory and shifting costs should be kept apportioned to each class of work, and reduced to unit costs.

If these methods are adopted, profits will be increased or losses decreased. If engineers in charge of contract work will follow the same method, they will usually discover that there is little or no profit to the average road contractor. Indeed, unless engineers give adequate study to the costs of lost time, overheads, plant installations, etc., and unless they devise ways of enabling competent contractors to secure adequate prices, it will be only a matter of a few years before there will be no competent contractors in the road building business.

#### INCLINED VIADUCT FOR PEDESTRIANS.

To avoid the necessity of a long detour, or else a dangerous track crossing and the climbing of a flight of steps up the bank on the further side, the viaduct shown in the illustration was built to be used by pedestrians only, steps at the end insuring that teams do attempt to use it. The approach is built with concrete retaining walls; the remaining portion being of steel girder and trestle construction. The pipe railing on each side has wire fencing fastened to it to prevent children from falling through.



## The WEEK'S NEWS

**New Highway Legislation in Indiana—County Engineers in Washington—Planning New Jersey Highway System—State to Analyze All Water Supplies in Indiana—California's Proposed Hydroelectric Development—Water-Power Development in Canada—Fire Prevention in Indianapolis—Pennsylvania's Forest Fire Loss—Proposed Federal Utilities Board—New Manager Towns—Proposed American Mayors' League.**

### ROADS AND PAVEMENTS

#### Indiana Highway Legislation Passed.

Indianapolis, Ind.—Indiana now is ready to carry out a big program of road construction under the state highway commission and county unit road laws which have been enacted by the legislature and which contain emergency clauses. If Indiana matches all the federal aid money available up to and including 1921, almost \$15,000,000 will be expended on state highways in three years. How much will be expended under the county unit law and the old three-mile road law, is not estimated, although it is believed that the amount will greatly exceed that which will be expended under the direction of the state highway commission. In 1914, before the war put a check on bond issues, about \$8,000,000 was expended in the state under the three-mile road law. In many cases it is believed that the county unit law will be used instead of the three-mile road law. Under the county unit road law, bonds may be issued up to 2 per cent of the assessed valuation, while under the three-mile law the bonding limit is 4 per cent. Under the new tax law, however, all bond issues must be approved by one of the state board of tax commissioners, unless an issue is for \$50,000 or more, and in the event the state board of tax commissioners disapproves such an issue, its decision may be overthrown by a referendum vote of the taxing district. This power of the state board of tax commissioners may operate to place a check on extravagant or ill-considered road projects under the county unit or three-mile road laws. The state board may, if it chooses, refuse to approve a bond issue under either of these laws, even if the issue is within the 2 and the 4 per cent limit. The state board also has the power, "to finally determine all tax levies of the state," and this power will affect the road program, inasmuch as road construction leads to tax levies. There is available for state highway construction in Indiana \$2,163,392.44 of federal aid money, which under the fifty-fifty federal law must be matched by the state. By June 30 of this year there will be available \$539,967.76 more of federal aid money. It is not believed that the state can use all of this money this year, but the sum not used will remain to the credit of the state. The state funds available this year will amount to about \$2,000,000. Up to and including 1921, there will be available for Indiana a total of \$7,428,078.10 from the federal government. The new county unit bill provides that in the building of roads costing more than \$2,000 a mile, or a bridge costing more than \$2,000, a petition of fifty freeholders of a district to be assessed may cause the plans and specifications to be submitted to the state highway commission for approval, and another petition of fifty freeholders may bring about inspection of the work on the road by a representative of the state highway director. The law takes the supervision of dirt roads from the township trustees.

#### Plan to "Take County Engineer Out of Politics."

Olympia, Wash.—A bill to abolish the office of county engineer and to substitute a superintendent of highways appointed by the county commissioners and to serve as long as he makes good, has been prepared by representative J. V. Hubbell, of Kittitas. This bill would make the county commissioners agents of the state highway depart-

ment and require the appointment of a competent engineer with five years' experience as highway superintendent, the state to pay the superintendent \$100 a month and the county such other salary as may be necessary, not to exceed \$5,000 a year. "This would make it possible to build up in the state a real highway machinery," says the author of the bill, "and the superintendents would get the training and experience so that in time they would become expert engineers. It would be a much better plan for the state than the present one. It would take the county engineer out of politics."

#### Plan to Unify County Highway System.

Trenton, N. J.—Recommendation is made in a report submitted to the legislature by the state commission for the investigation of county and township highways to place control of county highways in the hands of boards of freeholders, but with final authority resting with the state highway commission. This recommendation will not lessen in any way the jurisdiction of the freeholders, and final authority with the state will only be used to guide the county highway control into channels which will make necessary co-operation between counties, the report declares. The commission advises each county to exercise its jurisdiction in county highways through the medium of a committee of not more than five members, each to be a member of the board of freeholders. It is also recommended that all bridges, culverts and structures of a similar nature which are integral parts of a county highway should be treated as such in all questions of jurisdiction, engineering and finance. Activities of the county highway committee, the commission advocates, should be performed through a county highway department. By the creation of these departments there will be set up in all the counties of the state a central organization through which the scattered operations now performed by the county highways committees, county bridge committees, county engineer and county supervisor of highways can be assembled, correlated and unified. Under this plan, there will be one head upon whom can be fixed individual responsibility for getting all the work in connection with county highways done properly. Similarity of structure and method of operation of these departments, and the fact that the intent will be to carry out policies working for a goal common to all of them, will be a step in the direction of unifying twenty-one systems and co-ordinating county highways. The head of the department should have the power to appoint, subject to the approval of the highway committee and freeholders, all assistant officers and other employees necessary. He should also have authority, the commission believes, to build up whatever type of engineering organization and conduct its operations as he may deem best. Engineering operations, it is declared, conducted in connection with the county highways of the several counties should be differentiated in accordance with the definitions of terms now or hereafter provided by law to be used in continuing these activities on the highways of the state system. Provision is made to prevent the waste of money by the counties in putting through highway operations which meet the exigencies of the moment, but are so short-lived that they must be repeated at frequent intervals.

The commission recommends that each county highway committee should submit to the freeholders and the state highway commission all activities the committee deems advis-



able for the county to undertake in the matter of county highways during the period between January 1, 1920, and December 31, 1924. It is advised that the freeholders hold a public hearing at the courthouse October 15, this year, at which the five-year work plan and written suggestions upon it submitted by the state highway commission should be considered and any taxpayer given an opportunity to express himself upon the program.

Instructions are recommended that the freeholders of each county shall not later than November 1 this year file with the state highway commission the five-year program of county highway projects. The state highway commission, not later than November 15, should have power to accept the program and order changes it believes best in the interest of the state and counties.

Under this plan the state highway commission should have the power to obtain from each board of freeholders information regarding its expenditures for county highways. In this connection, it is recommended, the commission should also have authority to require the use of such blank forms as it may deem proper for the supplying of this information, and to cause the submission of the blanks properly filled in at such time and place as it may specify. This would enable the keeping of complete and accurate records regarding the expenditures made annually by each county and by all the counties of the state upon county highways.

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## WATER SUPPLY

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### All Water Supplies Must Be Analyzed by State.

Indianapolis, Ind.—With the signing of a new bill by Governor Goodrich, arrangements were started by Harry E. Barnard, state food and drug commissioner, to receive samples of water for analysis in the water and sewage laboratories. The law requires that all companies selling water in the state, including mineral and bottled water, shall submit samples for analysis before July 1. Although the bill carried no emergency clause, it is expected that it will be promulgated with others in time to admit of a test of the drinking waters of the state this year. The state board of health, under the provisions of the bill, is authorized to quarantine the source of a water supply found deleterious to the public health. The bill provides that any party believing himself aggrieved at the board's ruling may have the right to appeal to the courts within ten days on filing a bond for the costs of such action. Severe penalties attach to violations of the regulations of the board relative to the sale of water ranging from a minimum fine of \$10 to a heavier penalty to which may be added a jail sentence.

### Water Rate Increased for Large Consumers.

Wilmington, N. C.—An ordinance revising the rates to be charged and collected for water furnished by the city plant for domestic use and other purposes has been adopted by the city council, effective April 1. The ordinance makes only slight change in the present rate to small consumers but carries an increase on the larger users. The measure was introduced by councilman E. A. Metts, chairman of the waterworks committee, who stated the plant is now losing money. He said the increased rate would fall on less than one hundred firms of the city. The ordinance revising the water rate carries a graduated scale, ranging from \$1.50 per 1,000 cubic feet for 2,000 or less consumption to 80 cents per 1,000 where the consumption is more than 50,000 cubic feet, with a minimum charge of \$3 per quarter. Fixture rates are placed at \$2 per house per quarter for one fixture, with \$1 for each additional fixture. Discounts of 10 per cent will be allowed for payment before the 10th of the month in which the quarter begins.

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## STREET LIGHTING AND POWER

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### Light Company Declared to Have Perpetual Franchise.

Omaha, Neb.—The United States circuit court of appeals at St. Paul, Minn., has decided that the Nebraska Power Company has a perpetual franchise for the supplying of electric heat and power in Omaha. The court affirmed the opinion of district judge Woodrough in Omaha. The question of the electric company's franchise to supply electric light in Omaha had already been decided by the United States supreme court in the Colony

Trust company case. The present decision makes a complete victory for the electric company so far. Following the decision as to the light franchise the city passed a resolution that the electric company could not distribute more electric heat and power under its franchise. The company secured an injunction, and it is on this injunction that the present case was based. Corporation Counsel Lambert will appeal the case to the United States supreme court. It has already been in the circuit court six times and to the supreme court three times on various phases of the question. The decision, says Mr. Lambert, does not absolutely prevent the city from acquiring the electric plant, but the ownership of the perpetual franchise would tend to vastly add to the price the city would have to pay. He says he believes there is a good chance that the United States supreme court may reverse the circuit court decision.

### California Plans Big Water-Power Projects.

Sacramento, Cal.—Development of hydro-electric power and the irrigation of 25,000 acres of land in Superior California through the construction of storage reservoirs on the rivers and streams tributary to the Sacramento River is about to be undertaken by the state of California. It is proposed to construct at least seven storage reservoirs of large capacity on the Yuba, Feather, American and Bear Rivers and on the other streams flowing into the Sacramento. The territory to be affected is located between Redding and Sacramento. At the present time there are no irrigation systems in this territory outside of those immediately adjacent to the Sacramento River. A vast acreage of land capable of irrigation lies in the foothills and rolling land away from the big stream, and this it is proposed to serve by the state irrigation project. The development of cheap hydro-electric power is also expected to be an immense stimulus to industry in the region indicated. Present plans have to do not only with the exploration of the territory with a view to selecting the sites for the storage reservoirs. At the present time experts connected with the state engineering department have in view seven available sites, capable of impounding vast bodies of water which is now running away, a flood menace to the low lands and a waste besides. It is expected that the exploration program will develop a number of other good sites for reservoirs. W. F. McClure, state engineer, has placed the exploration work under the supervision of S. W. Curtis, assistant state engineer. It is expected that the work will require about a year. At the conclusion of the exploration for available storage sites, a report will be made to the state engineering board, after which the surveys will be made with a view of estimating on the cost of construction, which will run into the millions of dollars.

### Water Power Resources of Canada Being Developed.

Ottawa, Canada.—A census of the developed waterpower in the Dominion just completed by the Dominion Water Power Branch, in co-operation with the Dominion Census Bureau, discloses some interesting figures. The water-power resources of Canada, with their strategic locations adjacent to practically every industrial centre, the report says, constitute one of Canada's greatest assets, and it is satisfactory to note that the economic advantages accruing from utilization of these powers for industrial purposes is being fully realized in practice. The returns indicate a total developed water-power capacity of 2,305,310 horse-power. This figure is several hundred thousand in excess of any estimate previously published, and indicates that Canada's utilization of hydro power is even more marked than had been realized. Of the total water-power developed, 1,727,471 horse-power is installed in central electrical stations, that is to say, in stations developing electrical energy for distribution and sale; 352,214 horse-power is installed in plants owned and operated by pulp and paper companies, and 225,625 horse-power is installed in other miscellaneous manufacturing and general industrial establishments. The foregoing figure for pulp and paper companies does not, however, represent the total amount of water-power used in that in-

dustry; upwards of 100,000 horse-power of hydro-electric power in addition is purchased by pulp and paper companies from central electrical stations, making the total hydro-power utilized in pulp and paper industry some 450,000 horse-power. The central stations already constructed throughout the Dominion are designed for a machine installation of 530,000 horse-power, in addition to the machinery now installed. Of this amount, the installation of some 270,000 horse-power is at the present time under contemplation in various parts of the Dominion. These figures do not include the 300,000 horse-power Queens town plant, which the Hydraulic Power Commission of Ontario has under construction at Niagara. The per capita figures of hydro-power developed for the Dominion, when compared with similar figures for other countries, are indicative of the advanced position which this country takes, both in the extent and in the utilization of its water-power resources. Norway, and possibly Sweden, are said to be the only countries where the per capita utilization of water-power exceeds that of Canada. The most recent figures available for the United States would indicate a utilization of less than 100 hydraulic horse-power per thousand population, as compared with 276 per thousand in Canada. The fundamental reason, it is said, which underlies the extensive use of water-power in Canada is the fact that practically every commercial centre from coast to coast, excepting only a few in the middle prairie provinces, has abundance of water-power available, not only for present needs, but for all anticipated requirements.

## FIRE AND POLICE

### To Start Two-Platoon System.

Boise, Ida.—Council has passed an ordinance providing for a two-platoon system in the city fire department. It provides that, "At the expiration of six months' operation of the two-platoon system in the fire department, the chief be instructed to make a complete report of the working of the new system, to show comparisons with the present plans, and that the council shall then determine whether to revert to the old plan or not." The new system will go into effect April 1.

### Fire Prevention in Indianapolis.

Indianapolis, Ind.—A. L. Taggart, president of the board of public safety, has made the following announcement relative to the newly organized city fire prevention bureau: "With the establishment of the municipal fire prevention bureau, the city of Indianapolis has a right to expect results and the board of safety is responsible. Under the system which the board is now putting in operation, chief John C. Loucks and Jacob H. Hilke, director of the fire prevention bureau, will be jointly responsible for the fire prevention work done by the department. The battalion chief in charge of each district will be held responsible for the work within his district and will be required to see to it that captains, lieutenants and members of their commands conduct inspections diligently and faithfully report such inspection. The opportunity for real service to the taxpayers of this city lies within the grasp of the fire department. This can be done by systematic, intelligent inspections conducted in a courteous manner, showing not only to the owners of large business buildings but also to owners or renters of the smallest cottages, how the hazard from fire may be reduced to a minimum." It is the object of the board to have the firemen in each district familiar with every building in that district to the end that fire hazards will be reduced and that in case of fire the firemen will not work at a disadvantage.

### Big Fire Loss in Pennsylvania.

Harrisburg, Pa.—The assertion recently made by Gifford Pinchot, chairman of the committee on conservation of the Pennsylvania State Grange, that Pennsylvania's fire losses amount to \$50,000,000 annually is based on information obtained from the State Forestry Department. According to George H. Wirt, chief forest warden, and head

of the Bureau of Forest Protection, the actual loss in timber is \$500,000 a year. This, he says, is only a small part of the loss, for it does not include the loss in buildings, fences, timber in various stages of manufacture, and to the humus and litter that act as mulch and prevent rapid evaporation. It does not include the loss of seeds, seedlings and sprouts, birds, game and fish. The biggest item not included in the \$500,000 loss is the millions of dollars' worth of lumber that could be grown on the hundreds of thousands of acres of land which are burned over annually and allowed to remain barren. These wastes, devoid of moisture-holding soil, permit the rains to go immediately into the streams, and the floods that destroy much property result. The \$50,000,000 estimate is conservative, according to Mr. Wirt. "The prevention of forest fires is absolutely necessary for the welfare of the state," he said, in discussing the Pinchot statement. "Some fires will always occur, but they must be extinguished quickly, and this means that Pennsylvania must have an efficient organization and equipment for prevention, detection and extinction. In this state I believe that the best organization is through the foresters and rangers and special police who operate from tall towers. The game protectors also are forest wardens. The force of wardens, however, must be limited in this state now because of our lack of funds. The department should be supplied by the Legislature with from \$150,000 to \$200,000 a year for ten years. This fund would provide adequate money for permanent towers and the building up of a force. Then the appropriations could be decreased. There are now eleven steel towers, some not on state forest lands, and thirty-two wooden towers. From some of these the wardens can see twenty-five to thirty miles on clear days. If this system were provided, we could cut the forest fire losses from \$50,000,000 a year from all causes to \$1,000,000. Pennsylvania has much the same system as Massachusetts, except that there the appropriation is larger and the system can be carried out in detail. The size of the average tract burned over in that state last year was but eleven acres. In Pennsylvania the average number of acres burned in each forest fire was 154, while last spring it was 163. The tower plan of watching is satisfactory and when fires are discovered telephones can be used to round up men from all directions, and these can be hastened to the fire in automobiles. The wireless telephone will soon be practicable for the fire wardens, and this will reduce the losses by reason of the fact that fire fighters from all directions can be summoned at once."

## GOVERNMENT AND FINANCE

### Federal Utilities Board Proposed.

Washington, D. C.—Several Government departments have under consideration the organization of a board to hear cases involving disputes over rates between local authorities and street car, gas and electric companies, and other public utilities, and to make recommendations. No legal power would be sought to provide for the carrying out of these recommendations, dependence being placed upon moral influence. The proposal was discussed with President Wilson before his departure for Europe and his approval was asked. Some announcement of the Government's course is expected soon. The need for some sort of Federal action to stimulate the consideration by local authorities of utilities' applications for higher rates grows out of the fact that wages and costs of materials are rising, and in many cases higher wages have been granted at the order of the War Labor Board. City councils, utilities commissions, and other local authorities have been slow to act on applications for higher rates to meet increased operating costs, according to reports to the War Finance Corporation, War Labor Board and Labor Department. Consequently it is reported that many utilities face a serious financial situation. Since these utilities, particularly street car companies, are large employers of labor, and purchasers of supplies, the Government is concerned. Conferences between officials of the Treasury, Labor Department, and the War Labor Board resulted in the suggestion to President Wilson that he ap-



prove the formation of a voluntary board, composed of representatives of utilities, employees, and Government departments, to hear appeals of utilities rates either from the company or public interests. The Board's decision would not be absolutely binding, but officials point out that its authority might be somewhat comparable to that of the War Labor Board as now constituted. Arguments against the plan presented by Government officials, are that it might savor of extended Government interference with local business affairs, and the Government is represented as anxious to promote the "hands-off" policy as rapidly as readjustment conditions justify. This situation has postponed adoption of the plan heretofore. About one hundred public utility corporations have applied to the War Finance Corporation for loans to tide them over the period of financial stress caused by soaring operating costs not matched by rate advances. In most cases the company's financial conditions were regarded as not healthy, however, since adequate security could not be furnished, and assistance was not given. Only nine public utilities have obtained loans, aggregating \$39,000,000, from the corporation.

#### Two New Manager Towns.

Muskegon, Mich.—By a 4 to 1 vote, the city has adopted a new charter providing for the appointment of a manager. The population is about 26,000.

McCracken, Kans.—This town has adopted the commission-manager form of government by a vote of 87 to 4. The population is about 1,000.

#### Town Wants City Manager.

Hays, Kans.—This town wants a city manager to begin work at once. The salary will be about \$3,000 a year. Applications should be addressed to Secretary, Chamber of Commerce, Hays, Kansas. The city manager must be an engineer. The engineering and building assets of the community that the manager must superintend in addition to other duties include the light plant, waterworks, city hall and sewer system. The city manager form was approved at a recent election by a two-to-one vote. Hays is a town of approximately 3,300 people located in western Kansas, on the Union Pacific.

#### Wealthy Suburb Refuses to Join Boston.

Brookline, Mass.—The citizens of this town, which is a wealthy suburb of Boston, at a town meeting, have voted 193 to 1 against annexation to Boston. Mayor Peters, of Boston, recently started a campaign for a greater city by annexation of surrounding towns. Brookline has lower tax rates than Boston and is satisfied that the town form of government has resulted in adequate administration. At the town meeting, the appropriations committee recommended annual appropriations totalling \$2,538,288.

#### Mayors Want American Mayors' League.

Washington, D. C.—Following the recent Governors' and mayors' conference held here, a number of the mayors present met and unanimously voted to recommend to all mayors of cities of 25,000 population or over the formation of a permanent organization which may perhaps become known as the American Mayors' League. A resolution was passed requesting the Secretary of Labor to call such a conference not later than Feb. 1, 1920. All agreed that there should not be over one set speech each day of a conference extending to at least four days. It was also voted that Congress be asked to adjourn at least one day during the conference, and hear the report which the mayors might have to offer. The following committee was appointed to take all matters concerned into consideration and report: Chairman George L. Baker, mayor of Portland, Ore.; secretary, R. W. Babson, Boston; together with F. W. Donnelly, Trenton, N. J.; W. Montague Ferry, Salt Lake City, Daniel W. Hoan, Milwaukee, Wis; and R. J. Wheeler, Allentown, Penn.

## LEGAL NEWS

### A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

#### Garbage Removal Contract—Compliance—Payment.

(Mo.App.) Where garbage removal contract required performance to satisfy the city council, the council could not arbitrarily refuse payment for completed services because they were unsatisfactory; but such clause merely permitted termination of the contract when the services became unsatisfactory, so that the contractor could recover the price on a showing of substantial compliance with the contract.—Boyer v. Kansas City, 205 S. W. 873.

#### Invalid Issue of Bonds—Bonded Indebtedness.

(Ill.) Where a municipal corporation has made an invalid issue of bonds, a subsequent issue to replace such bonds, enjoined by the courts and thereafter destroyed, will not be included in estimating the bonded indebtedness of the municipality.—Worley v. Idleman, 120 N. E. 472.

#### Sale of Asphalt by City—Price Subject of Ordinance.

(Wash.) A taxpayer may maintain an action to enjoin a city and its street superintendent from selling asphalt manufactured by the city until an ordinance has been passed fixing the price at which the product may be sold; such ordinance being required by the charter.—Shanstrom v. Case, 175 P. 323.

#### Police Power of City to Regulate Construction of School Buildings.

(Utah.) Police power conferred on cities should be construed and applied so as to meet the dangers incident to and arising out of the subject-matter covered.—Salt Lake City v. Board of Education of Salt Lake City, 175 P. 654.

(Utah.) Comp. Laws 1907, section 206, subds. 55, 56, do not give to cities the power to regulate the construction of public school buildings, in view of sections 1892-1961, placing control of public schools of cities of first and second class in boards of education of such cities, section 1962, as to compulsory attendance, and Const. art. 10, as to control of public school system being vested in Legislature.—Id.

The mere fact that no police powers are vested in boards of education is not decisive of the question whether the state has by Comp. Laws 1907, section 206, surrendered to cities police power over public school buildings.—Id.

School buildings are not included within designation "public buildings" or "all buildings" mentioned in Comp. Laws 1907, section 206, subds. 55, 56, as to power of city commission to require buildings to be constructed of fire-proof material, etc.—Id.

Ordinance of Salt Lake City, section 435, requiring the placing of fire alarms or telephones in all school buildings, is valid.—Id.

#### Rights of Pedestrian and Automobile on Street.

(Mass.) Neither pedestrian nor driver of automobile has rights in street superior to those of other, but each is bound to act with reasonable regard to other's presence.—Emery v. Miller, 120 N. E. 655.

#### Raising Grade of Street Above Ditch—City Liable for Flood Damages.

(Cal.) Where contractor, in raising grade of street above a ditch, a change which flooded abutting property, acted under instructions of city engineer, rather than terms of city ordinance or his contract, the city, having accepted street and maintained it, was liable for his act and the flooding.—Newman v. City of Alhambra, 175 P. 414.



## NEWS OF THE SOCIETIES

**April 14-19.**—UNITED STATES GOOD ROADS ASSOCIATION. Annual convention, Mineral Wells, Tex. Secretary, F. A. Rountree, Birmingham, Ala.

**April 16-17.**—AMERICAN WATER WORKS ASSOCIATION, IOWA SECTION. Fourth annual meeting, State University, Iowa City, Ia. Acting Secretary, J. H. Dunlap, State University.

**April 25-26.**—AMERICAN ACADEMY OF POLITICAL AND SOCIAL SCIENCE. Annual meeting, Philadelphia, Pa. Secretary, J. P. Lichtenberger, Logan Hall, West Philadelphia, Pa.

**June 9-13.**—AMERICAN WATER WORKS ASSOCIATION. Thirty-ninth annual convention, Iroquois Hotel, Buffalo, N. Y. Secretary, J. M. Diven, 47 State street, Troy, N. Y.

**Nov. 12-14.**—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Bloomington, Ill.

### Associated General Contractors of America.

At a meeting of the Executive committee of the Associated General Contractors of America, held in Washington recently, it was decided to engage G. W. Buchholz as acting secretary of the association with the duties of executive manager. Wm. A. Davis was also employed with the title of organization manager to assist the secretary.

Mr. Buchholz graduated from Columbia University, a civil engineer, in 1901. Since that time he has engaged in general contracting principally with the Snare & Triest Co., New York, and the North-Eastern Construction Co. of New York.

Mr. Davis was recently connected with the War Labor Board and has successfully organized a number of industrial associations, prominent among which is the National Association of Manufacturers.

The association has taken offices in the Conway Building, 111 West Washington Street, Chicago, which will be its headquarters, with a branch office in New York, which will be at 225 Fifth Avenue, until May 1.

### Oklahoma Society of Engineers.

The annual meeting of the Oklahoma Society of Engineers, which was postponed last October because of the influenza epidemic, was held in Oklahoma City, Mar. 6. Reinforced-concrete tanks were discussed.

Officers of the society for the short term of 1919 were elected as follows: President, T. P. Clonts, county engineer, Muskogee; vice-presidents, Col. Frank B. King, R. E. Brownell and D. W. Patton; secretary, H. V. Hinckley, Omaha City, Okla.

## PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Desplaines, Ill., is contemplating PAVING IMPROVEMENTS, involving three miles of asphalt or concrete. The consulting engineers are Ewing & Allen.

PAVING IMPROVEMENTS are to be made by the city of Bristow, Okla., for which preliminary plans have been prepared by the Benham Engineering Co., consulting engineers.

PAVING IMPROVEMENTS, including paving and curbing, to cost \$50,000, are to be made by the village of North Canton, according to plans prepared by the consulting engineering firm, Guily & Rice.

Leon county, Centerville, Tex., is to make ROAD IMPROVEMENTS, consisting of the construction of the east branch of the Exall highway, involving an expenditure of \$146,000. The consulting engineers are Bryant & Huffman.

The city of Edgerton, Wis., will take bids on approximately 30,000 square yards of reinforced concrete PAVEMENT and two miles of sanitary SEWERS. Plans have been prepared by W. F. Reichardt, consulting engineer.

Cuyahoga Falls, O., is taking bids on bonds for WATERWORKS IMPROVEMENTS to cost \$300,000. W. J. Sherman is the consulting engineer.

A PUBLIC PARK is to be built by the city of Boston, Mass. It is to include concrete walks, retaining walls, drinking fountains, etc., and the plans were prepared by the consulting engineer, Charles E. Putnam.

SEWERAGE WORK, involving storm and sanitary sewers, is contemplated by the village of Bexley, O., according to plans prepared by the consulting engineering firm of Jennings & Lawrence.

ROAD IMPROVEMENTS are to be made in Van Buren, Stone and Newton counties, Little Rock, Ark., involving the construction of 64 miles of road. The consulting engineers are Pritchett & Hight.

Kansas City, Mo., is receiving bids for the construction of a concrete VIADUCT for street car and highway with approaches about 3,000 feet in length. The estimated cost of this structure is \$700,000, and plans were prepared by the consulting engineers, Harrington, Howard & Ash.

## PERSONALS

Blanchard, Arthur H., consulting highway engineer, has been appointed Chief of the Bureau of Public Works, Department of Citizenship, under the Army Overseas Educational Commission. General Pershing has requested the Y. M. C. A., through its Commission, to take charge of the development of instruction and courses for all educational work of the Army overseas. The staff of the Bureau of Public Works and Army instructors in 500 post-schools throughout France will give lectures and courses relative to waterways, railways, highways, bridges, water supply, sewerage, waste disposal, public utilities and irrigation. Special emphasis will be placed on the economic value of good roads to the nation, state, county and town, and on efficient methods of highway, railway and waterway transportation.

Sands, E. E., has resigned as chief engineer of the city of Houston, Tex., to go to New York where he will engage in private practice. He had been in Houston since 1912. As consulting engineer and assistant to the construction quartermaster, Mr. Sands directed the laying out of Camp Logan. As a government man at government pay, on leave of absence from city work, he built the sewer and water systems at Kelly Field at San Antonio. Gerstner Field at Lake Charles, La., and many other government assignments were under his direction.

Routh, James W., engineer for the Rochester, N. Y., Bureau of Municipal Research, has been appointed director to succeed Le Roy E. Snyder. The newly chosen director of the research bureau has been associated with the institution since its establishment four years ago, being the principal worker in the preliminary survey of the local city government, prior to the establishment of the bureau. He was also associated with the New York Bureau of Municipal Research. Mr. Routh is a practicing civil engineer, holding degrees from the University of Minnesota, also Cornell University. While active in his profession he was in charge of the construction of a large hydroelectric plant near Spokane, Wash.

Booth, R. A., has resigned as state highway commissioner of Oregon.

Davis, Charles, was recently reelected mayor of El Paso, Tex.

McVea, J. C., has been appointed acting city engineer of Houston, Tex., to succeed E. E. Sands, resigned.

Shannon, Lieut. G. D., Ordnance Department, U. S. A., formerly highway division engineer, Vermilion County, Illinois, has received his discharge from the service and has become highway engineer of the Joplin, Mo., road district, in charge of construction.

# NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

## PORTABLE POWER LOADER.

### For Handling Gravel, Sand, Stone, Etc.

Those engaged in construction work are proving to themselves more and more that economy lies in the reduction or elimination of hand labor. The price of labor is high, and time is always a factor in work because of high overhead costs. In a large proportion of construction work the handling of materials, particularly in loading and unloading, is responsible for substantial costs. These can be cut materially by substituting mechanical loaders for the slow and inefficient hand shoveling.

The Conant loading machine is made of steel, the frame being built of angle bars, braced and reinforced, with intersections hot riveted. Wheels and running gear are entirely of metal. It is designed and built for heavy duty in handling materials of various sizes, including those which are abrasive. The height of the standard loader is 11½ feet and the length is 8½ feet. The height of delivery is 7 feet 8 inches to 6 feet 10 inches.

The loader is of the bucket-and-chain type. The chains consist of two strands of Griplock chain, tested for 4,600 pounds working strain, or heavy detachable link chain, the joints being protected. For sand and gravel handling the buckets, which are of malleable iron, and of which there are about twenty, are 16 x 8 inch or 14 x 7. They may be equipped with digger teeth if

desired. Power for operation is from a 5-h.p. electric motor or an Ideal gasoline engine, the latter being, of course, generally required for gravel bank work.

With a Conant loader it is estimated that two men can do the work of six or eight hand shovelers in handling gravel, sand or crushed stone. The standard machine handles more than a cubic yard of aggregate material, and can fill a large truck in four or five minutes. At Camp Devens, Ayer, Mass., a contractor saved more than \$100 a day in the handling of materials, cutting down his labor from more than twenty-five to six men.

The machine is also used for handling coal at power plants and other utilities. It can load direct from bottom dumping cars onto truck or wagon. It may be equipped with screening apparatus. There is a specially heavy type for gravel bank work.

The loader is made by the Conant Machine Company.

## INDUSTRIAL NEWS

### Federal Board Lowers Steel Prices.

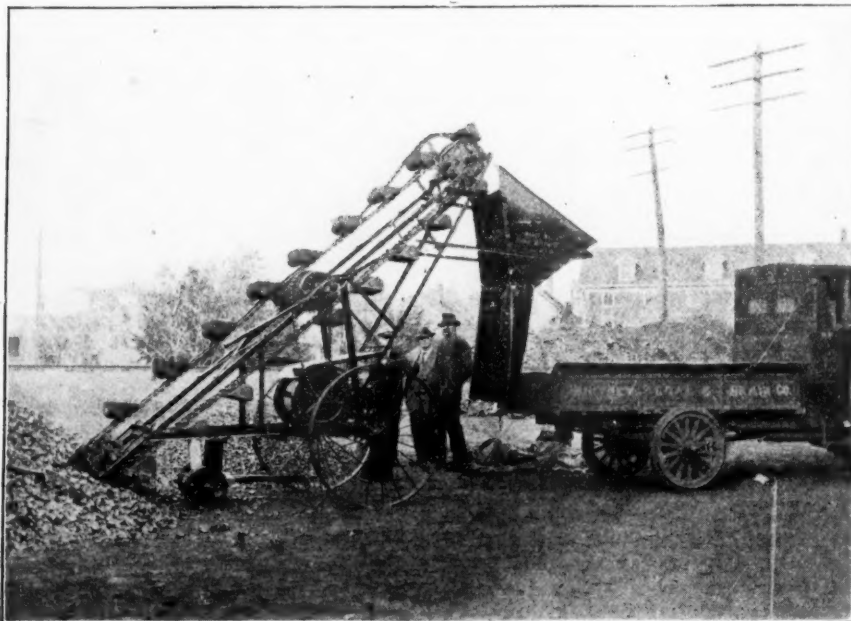
The first result of the formation of the Industrial Board of the Department of Commerce is the reduction in steel prices following conferences with the representatives of the steel industry. The prices are lowered by \$5 to \$7 per ton. George N. Peck, Moline,

Ill., is Chairman of the board. The procedure of the board is to suggest prices which will be accepted by the U. S. Government as equitable and which will be made the basis of all government purchases. It is hoped in this way to bring down prices generally and to encourage normal buying. Corresponding price reductions on cast-iron pipe are expected to follow reductions on pig iron throughout the country.

**The Otterson Auto-Eductor Co.**, 817 Fairbanks Bldg., Springfield, O., has recently shipped a number of auto-eductors. One for the Utilities Department, Q. M. C., at Camp Lee, Va., is a heavy duty machine mounted on a Class "B" military chassis for use in cleaning large grit chambers and septic tanks and other purposes. Similar machines have been delivered to the Utilities Department Q. M. C., at Camp Gordon, Ga., and to the Hawaiian Department, Fort Mason, San Francisco for shipment to U. S. Army Camp near Honolulu, H. I. The company has also delivered and demonstrated a standard auto-eductor for the borough of Brooklyn, New York City. This machine was driven overland from Springfield to New York.

**The Sullivan Machinery Co.**, Chicago, Ill., announces the appointment of Mr. Chester Mott as manager of its branch office at Denver, Colorado, 837 Equitable Building, succeeding Mr. Wallace T. Roberts, recently resigned. Mr. Mott has been associated with this company for several years past in the capacity of sales engineer at its Spokane, Washington, office and more recently at its Chicago office in charge of the company's interests in Iowa, Northern Illinois and Minnesota.

**The Dayton-Dick Co.**, Quincy, Ill., has changed its name to the **Dayton-Dowd Co.** The change was made owing to changes in organization. Capital has been doubled and the business placed directly under the control of those immediately interested. Facilities are greatly extended. The company has recently received many orders for large irrigation and drainage pumps, and it can now build any size from 1¼ inch to 30 inches in a split casing type of pump. It has developed a complete line of fire pumps, complying with specifications of the various underwriters' boards. It has also developed high pressure and hydraulic pumps for boiler feed, elevator pumps and similar high pressure service, and these lines are to be pushed to the utmost.

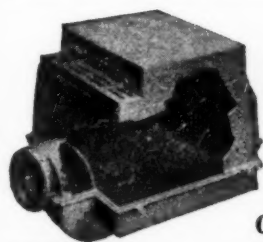


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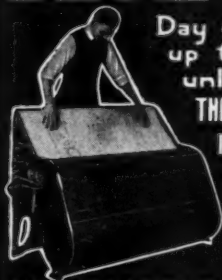
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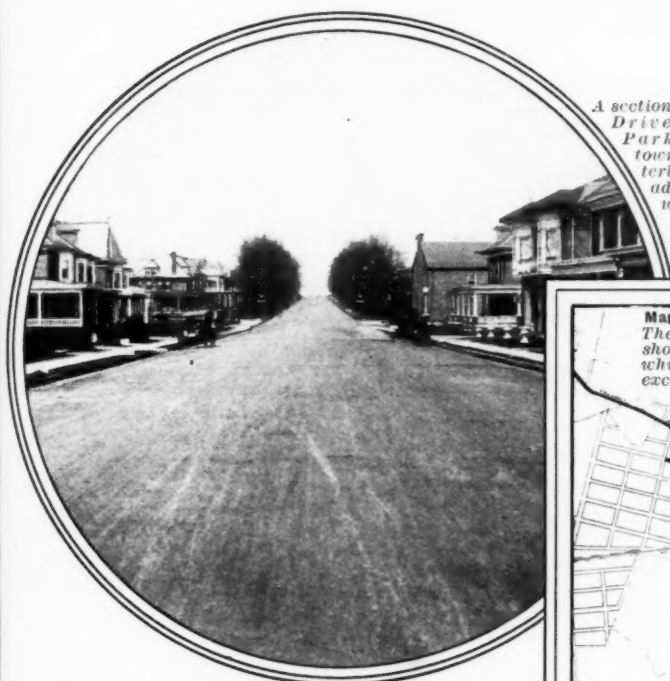
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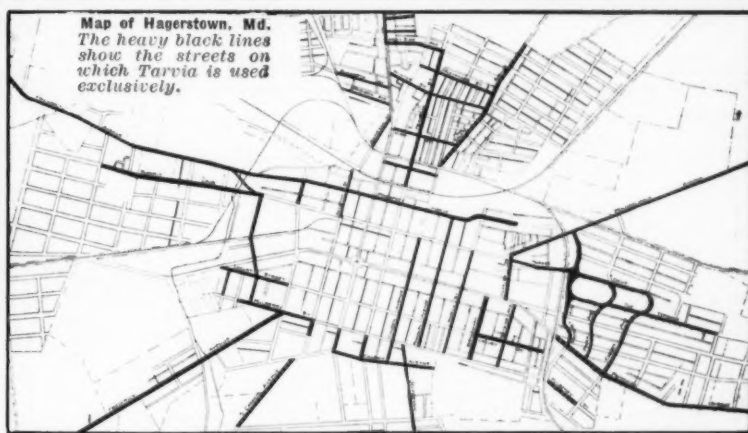


A section of "Upper Drive," City Park, Hagerstown, Md. Waterbound macadam treated with "Tarvia-B."

## Tarvia

Preserves Roads  
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Map of Hagerstown, Md. The heavy black lines show the streets on which Tarvia is used exclusively.



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On December 11, 1918, the President of the Board of Street Commissioners wrote us as follows:

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"Our streets have to stand very heavy automobile and truck traffic and we are convinced they would not do so without the use of Tarvia."  
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Such is the verdict after five years' experience with Tarvia.

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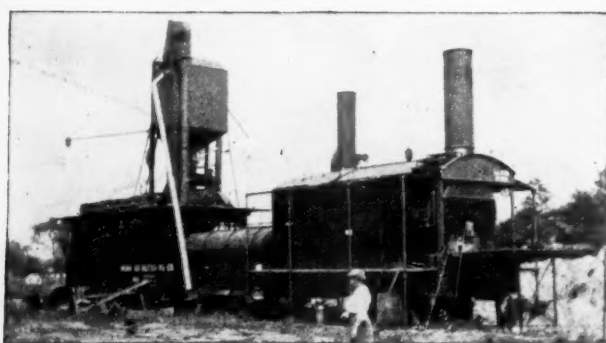
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